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EXAMINER	
MACARTHUR, SYLVIA	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 06/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/721,500	FINK ET AL.	
	Examiner	Art Unit	
	Sylvia R. MacArthur	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *5/19/2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1,2, 6, and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Benjamin et al (US 6,847,014).

Regarding claim 1,2, and 6: Benjamin et al teaches a chuck comprising a support 306, a solid thermal insulator 304 and a base 302. Benjamin et al further teaches that the base is constructed of a material that acts as a heat sink for the wafer and has a cooler to maintain the temperature of the surface of the base, see col. 4 lines 27-49 is that the thermal insulator acts as a thermal impedance break between the support 306 (with embedded heaters) and the base (heat sink/cooler).

Regarding claim 10: Temperature sensors 309 are mounted within the support according to col. 5 lines 5-41.

3. Claims 1,2, and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Nozawa et al (US 5,290, 381).

Claims 1 and 6: Nozawa et al teaches a low temperature plasma processor comprising a with top and bottom surfaces wherein the top surface supports a substrate, a plurality of temperature control element are provided heater 15 and 21 (cooling

container). A solid thermal insulator (cooling jacket) is provided and disposed between heater 15 and cooler 21, see col. 3 lines 49-56.

Claim 2: Fig.8 illustrates the temperature control elements receive separate fluid flows.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1,2, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihata et al (US 5,078, 851) in view of Benjamin et al (US 6,847,014).

Claims 1 and 6: Nishihata et al teaches a low temperature plasma processor comprising a base (holder) 11with top and bottom surfaces wherein the top surface supports a substrate, a plurality of temperature control element are provided 20,29 (heaters) and 13 (cooling container). A solid insulator is provided and disposed between heater 20 and cooler 13. Nishihata teaches that alumina is among the materials taught to construct the insulator used to separate the temperature control elements, see col. 4 lines 38-54. Note Nishihata fails to teach the material of construction of the base. Thus, there is no teachings of the coefficient of thermal conductivity (COT) of the base and a comparison of the COT of the base and insulator can not be made to determine if the insulator also functions as a thermal insulator.

Benjamin et al teaches a chuck comprising a support 306, a thermal insulator 304 and a base 302. Benjamin et al teaches that the base is constructed of a material that acts as a heat sink for the wafer and has a cooler to maintain the temperature of the surface of the base. The motivation to provide a thermal insulator as taught by Benjamin et al in col. 4 lines 27-49 is that the thermal insulator acts as a thermal impedance break between the support 306 (with embedded heaters) and the base (heat sink/cooler). Thus, it would have been obvious to use a thermal insulator to separate the temperature control elements of Nishihata et al with a thermal insulator as taught by Benjamin et al.

Claim 2: Fig.1 of Nishihata illustrates the temperature control elements receive separate fluid flows.

6. Claims 1-8,11, 12, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gilchrist et al (US 5,846,375) in view of Nozawa et al or Nishihata et al.

Regarding 1: Gilchrist et al teaches a thermally zoned substrate holder 14, comprising:

a base having top and bottom surfaces, the top surface configured to support a substrate,, see Fig.1.

a plurality of temperature control elements 32A-32D inside the base, each element having a top surface and a bottom surface;

at least one insulator 35, having a lower coefficient of thermal conductivity than a material of the base, the at least one insulator being disposed between the plurality of temperature control elements and substantially thermally separating the plurality of temperature control elements, see Fig. 2.

Gilchrist fails to teach that the insulator is solid.

The teachings of Nozawa et al or Nishihata et al were discussed above.

The motivation to modify the apparatus of Gilchrist with a solid insulator between the temperature control elements as taught by Nozawa or Nishihata is that the solid insulators of both prior art provide a greater level of insulation due to the use of a solid member which works to physically and electrically separate the plurality of control elements from one another thus promoting greater process control.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a solid insulator between the temperature control elements of Gilchrist.

Regarding claim 2: The apparatus according to claim 1, wherein first and second of the plurality of temperature control elements receive separate fluid flows 38a-d.

Regarding claim 3: The apparatus according to claim 2, wherein at least one of the fluid flows is substantially circular in the plane of the top surface of the substrate holder, see Figs. 1 and 2.

Regarding 4: The apparatus according to claim 2, wherein the fluid flows are concentric about a central axis of the substrate holder, see Figs. 1 and 2.

Regarding claim 5: The apparatus according to claim 2, wherein the at least one insulator 35 is concentric with the fluid flows.

Regarding claim 6: The apparatus according to claim 1, wherein the plurality of temperature control elements each include at least one heating element, see col.5 lines 9-15.

Regarding claim 7: The apparatus according to Claim 6, wherein each heating element is concentric about a central axis of the substrate holder, see Figs. 1 and 2

Regarding claim 8: The apparatus according to Claim 7, wherein the at least one insulator is concentric with each heating element, a combined set of heating and cooling elements is taught in col. 5 lines 9-15.

Regarding claim 11: The apparatus according to claim l , wherein the temperature control elements are radially extending, see Figs. 1 and 2.

Regarding claim 12: The apparatus according to claim 1, wherein the temperature control elements comprise radially extending elements and azimuthally extending elements, see Figs. 1 and 2.

Regarding claim 15: A thermally zoned substrate holder, comprising:

a base having top and bottom surfaces, the top surface configured to support a substrate; a plurality of temperature controlled passages inside the base, each passage having a top surface and a bottom surface, insulation means, having a lower coefficient of thermal conductivity than a material of the base, for substantially thermally separating the plurality of temperature controlled passages, the insulating means being disposed between the plurality of temperature controlled passages, see Figs. 1 and 2 and cols. 3-5.

7. Claims 1-13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (US 6,753,272) in view of Nozawa et al or Benjamin et al.

Regarding 1: Lee et al teaches a thermally zoned substrate holder 26, comprising:

a base having top and bottom surfaces, the top surface configured to support a substrate,, see Fig.1.

a plurality of temperature control elements 32 inside the base, each element having a top

surface and a bottom surface;

at least one insulator 42, having a lower coefficient of thermal conductivity than a material of the base, the at least one insulator being disposed between the plurality of temperature control elements and substantially thermally separating the plurality of temperature control elements.

Lee et al fails to teach that the insulator is solid.

The teachings of Nozawa et al or Benjamin et al were discussed above.

The motivation to modify the apparatus of Lee et al with a solid insulator between the temperature control elements as taught by Nozawa or Benjamin is that the solid insulators of both prior art provide a greater level of insulation due to the use of a solid member which works to physically and thermally separate the plurality of control elements from one another thus promoting greater temperature control..

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a solid insulator between the temperature control elements of Lee et al

Regarding claim 6: The apparatus according to claim 1, wherein the plurality of temperature control elements each include at least one heating element (lamps) see col. 7 line 3 of Lee et al.

Regarding claim 7: The apparatus according to Claim 6, wherein each heating element is concentric about a central axis of the substrate holder, see Figs. 2 and 2A of Lee et al.

Regarding claim 8: The apparatus according to Claim 7, wherein the at least one insulator is concentric with each heating element, see Fig. 2 of Lee et al.

Regarding claim 9: The apparatus according to claim 1, further comprising temperature detectors 34 disposed at predetermined positions in the temperature control elements of Lee et al.

Regarding claim 10: The apparatus according to claim 2, further comprising temperature detectors disposed at predetermined positions in the temperature control elements of Lee et al.

Regarding claim 11: The apparatus according to claim l, wherein the temperature control elements are radially extending, see Fig. 1 of Lee et al.

Regarding claim 12: The apparatus according to claim 1, wherein the temperature control elements comprise radially extending elements and azimuthally extending elements, see Figs. 2 and 2A of Lee et al.

Regarding claim 14: The apparatus according to claim 1, wherein the at least one insulator comprises a vacuum-filled chamber, see col. 7 lines 30-36 of Lee et al.

Regarding claim 15: A thermally zoned substrate holder, comprising:
a base having top and bottom surfaces, the top surface configured to support a substrate; a plurality of temperature controlled passages inside the base, each passage having a top surface and a bottom surface, insulation means, having a lower coefficient of thermal conductivity than a material of the base, for substantially thermally separating the plurality of temperature controlled passages, the insulating means being disposed between the plurality of temperature controlled passages, see Figs. 1, 2, and 2A and cols. 6 and 7 of Lee et al.

8. Claims 1-8, and 11-12 re rejected under 35 U.S.C. 103(a) as being unpatentable over Arai et al (US 6,664,738) alone as evidenced by the denotation of "rib" according to Answers.com.

Regarding 1: Arai et al teaches a thermally zoned substrate holder S, comprising:
a base having top and bottom surfaces, the top surface configured to support a

substrate,, see Fig.2.

a plurality of temperature control elements 11 and 12 inside the base, each element having a top surface and a bottom surface;

at least one insulator 13, having a lower coefficient of thermal conductivity than a material of the base, the at least one insulator being disposed between the plurality of temperature control elements and substantially thermally separating the plurality of temperature control elements, see Fig. 2.

Arai et al fails to specifically teach that the insulator is solid.

Arai does teach that the slit whose function to suppress heat transfer can be reinforced by a rib. According to Answers. com a rib a piece of material used to reinforce or support its point of use. In this case, as Arai et al teaches in col. 8 lines 35-40 that the use of rib would be motivated by a need to prevent the rigidity of the support being sacrificed. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to utilize a rib in the slit of Arai in order to increase the rigidity of the support while providing the thermal insulation between the thermal control elements.

Regarding claim 2: The apparatus according to claim 1, wherein first and second of the plurality of temperature control elements receive separate fluid flows, col. 2 lines 57-67.

Regarding claim 3: The apparatus according to claim 2, wherein at least one of the fluid flows is substantially circular in the plane of the top surface of the substrate holder, see Figs. 2-4.

Regarding 4: The apparatus according to claim 2, wherein the fluid flows are concentric about a central axis of the substrate holder, see Figs. 3 and 4.

Regarding claim 5: The apparatus according to claim 2, wherein the at least one insulator 13 is concentric with the fluid flows.

Regarding claim 6: The apparatus according to claim 1, wherein the plurality of temperature control elements each include at least one heating element, see col.4 line 50.

Regarding claim 7: The apparatus according to Claim 6, wherein each heating element is concentric about a central axis of the substrate holder, see Figs. 3 and 4

Regarding claim 8: The apparatus according to Claim 7, wherein the at least one insulator is concentric with each heating element 11/12, see Fig. 4

Regarding claim 11: The apparatus according to claim l , wherein the temperature control elements are radially extending, see Figs.3 and 4.

Regarding claim 12: The apparatus according to claim 1, wherein the temperature control elements comprise radially extending elements and azimuthally extending elements, see Figs. 1 and 2.

9. Claims 1-8, and 11-12 re rejected under 35 U.S.C. 103(a) as being unpatentable over Arai et al (US 6,664,738) in view of Nozawa or Benjamin et al.

The teachings of Arai et al were discussed above.

Arai et al fails to teach a solid insulator between the temperature control elements.

The teachings of Nozawa et al or Benjamin et al were discussed above.

The motivation to modify the apparatus of Arai with a solid insulator between the temperature control elements as taught by Nozawa or Benjamin et al is that the solid insulators of both prior art provide a greater level of insulation due to the use of a solid member which works to

physically and thermally separate the plurality of control elements from one another thus promoting enhanced temperature control.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a solid insulator between the temperature control elements of Arai et al with the solid thermal insulators of Nozawa et al (cooling jacket) or Benjamin et al (solid block of thermal insulation material).

Regarding claim 2: The apparatus according to claim 1, wherein first and second of the plurality of temperature control elements receive separate fluid flows, col. 2 lines 57-67.

Regarding claim 3: The apparatus according to claim 2, wherein at least one of the fluid flows is substantially circular in the plane of the top surface of the substrate holder, see Figs. 2-4.

Regarding 4: The apparatus according to claim 2, wherein the fluid flows are concentric about a central axis of the substrate holder, see Figs. 3 and 4.

Regarding claim 5: The apparatus according to claim 2, wherein the at least one insulator 13 is concentric with the fluid flows.

Regarding claim 6: The apparatus according to claim 1, wherein the plurality of temperature control elements each include at least one heating element, see col.4 line 50.

Regarding claim 7: The apparatus according to Claim 6, wherein each heating element is concentric about a central axis of the substrate holder, see Figs. 3 and 4

Regarding claim 8: The apparatus according to Claim 7, wherein the at least one insulator is concentric with each heating element 11/12, see Fig. 4

Regarding claim 11: The apparatus according to claim l , wherein the temperature control elements are radially extending, see Figs.3 and 4.

Regarding claim 12: The apparatus according to claim 1, wherein the temperature control elements comprise radially extending elements and azimuthally extending elements, see Figs. 1 and 2.

10. Claims 13-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Strang et al (US 6,949,722).

Strang et al teaches temperature control of susceptors wherein the heater and cooler are separated by a gas filled chamber (gap). The gap body is made of quartz (a known reflective material). Cols. 10 and 11 teach that varying the height or dimensions of the insulator serves to control the thermal conductance of the insulator and enhances thermal control. According to In re Woodruff, 16 USPQ2d 1934, it is obvious to one of ordinary skill in the art to determine the optimum value of a cause effective variable such as the dimensions of the gas filled insulation chamber through routine experimentation.Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to construct the gas filled chamber of Strang et al to the optimal height to provide optimal thermal insulation between the thermal control elements, thus enhancing temperature control of the wafer.

11. Claims 13-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arai, Lee, or Gilchrist (henceforth known as the *primary prior art*) in view of Strang et al.

The teachings of the *primary prior art* were discussed above. All fail to teach a gas filled chamber.

The teachings of Strang et al were discussed above. Strang et al fails to teach the dimensions of the chamber.

The motivation to modify the chambers of the *primary prior art to design the chamber with a height that will provide optimal thermal insulation between the thermal control elements of their respective substrate holders.*. According to In re Woodruff, 16 USPQ2d 1934, it is obvious to one of ordinary skill in the art to determine the optimum value of a cause effective variable such as the dimensions of the gas filled insulation chamber through routine experimentation.Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to construct the gas filled chamber of Strang et al to the optimal height to provide optimal thermal insulation between the thermal control elements, thus enhancing temperature control of the wafer.

12. Claims 15-17, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benjamin et al.

Benjamin et al teaches thermal breaks 510(gas filled chambers) to separate and thermally insulate thermal control elements (denoted by T1 and T2), see also col. 6 lines 46-63. Benjamin et al fails to teach the dimensions of the chambers.

The motivation to modify the chambers of the *primary prior art to design the chamber with a height that will provide optimal thermal insulation between the thermal control elements of their respective substrate holders.*. According to In re Woodruff, 16 USPQ2d 1934, it is obvious to one of ordinary skill in the art to determine the optimum value of a cause effective variable such as the dimensions of the gas filled insulation chamber through routine experimentation.Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to construct the gas filled chamber of Benjamin et al to the optimal height to provide optimal

thermal insulation between the thermal control elements, thus enhancing temperature control of the wafer.

13. Claims 13 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Benjamin et al in view of Nishihata et al.

The teachings of Benjamin et al were discussed above. Benjamin fails to teach that the chamber was constructed by a reflective surface.

Regarding claim 13: The insulator of Nishihata is made of alumina which comprises a reflective surface (a physical property of alumina. The motivation to provide the reflective surface is to further inhibit the flow of heat between the plurality of temperature control elements. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the insulator of Benjamin et al to include a reflective surface as taught by Nishihata.

Response to Arguments

14. Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection. The prior art of Benjamin et al was introduced to teach a solid thermal insulator separating a heat sink (base) from the support with embedded concentric heating elements. Benjamin et al also teaches the use of thermal breaks (gas-filled chambers) to separate thermal zones.

Upon review of Nogawa it is concluded that the rejection should be maintained with the cooling jacket anticipating the solid thermal insulation of the present invention.

15. The finality of the previous action has been withdrawn. Applicant's amendment of 12/1/2005 necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-F during the hours of 8:30 a.m. and 5 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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June 8, 2006